

Power to the People of India: U.S. Nuclear Cooperation with India

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Introduction

This article argues that the proposed U.S.-India civilian nuclear cooperation has significant merit, promising tangible energy, economic, and security benefits to India, the United States and the wider international community. India's acute energy needs and the upsides of the deal are greater than is generally appreciated. And while possible proliferation downsides exist, they have been exaggerated. The article lays out the argument in four parts. First, it examines India's energy situation and its relationship to the Indian economy. Second, it looks at India's options for improving its energy outlook and the role of nuclear energy among those options. Next, it addresses proliferation concerns; and, finally, it ends with a discussion of regional security considerations, especially with respect to a possible arms race with China.

In the summer of 2005, the U.S. and Indian governments publicly announced plans for a deal to cooperate on civilian nuclear power production. Some observers quickly condemned the deal on the basis that such cooperation would be bad for global nonproliferation efforts. Similar criticism eight months later, following the joint U.S.-Indian announcement of an agreement on the substance of the deal, left many Americans with the impression the administration had decided to accept a bad deal.

In reality, the deal has significant merit, promising tangible energy, economic and security benefits to India, the U.S. and the wider international community. India's acute energy needs and the upsides of the deal are greater than is generally appreciated. And while possible proliferation downsides exist, they have been exaggerated. The proposed deal presents an opportunity to strengthen U.S.-India ties in a way that is good for the U.S., India and others.

I.

There is a very strong correlation between energy consumption and both economic growth and human development. This correlation once led the World Bank to focus approximately a quarter of all development financing on programs to improve energy services.^[1] Currently rural areas of India are the least served by electricity, and over 40 percent of households nationwide lack electric services. With 60 percent of India's 1.1 billion people engaged in agriculture, India could

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vastly improve its productivity and trade in farm goods by providing electricity to rural areas for food processing and refrigeration. Indians, especially rural farmers, operate hundreds of thousands of small diesel generators to meet their electricity needs, adding to the global demand for oil.[2] Thus, greater electric generating capacity is not just a key to Indian development, it would also marginally curb the nation's growing demand for oil.

For developing countries, the growth required in electric power production has historically exceeded GDP growth-rates, such that a country seeking to sustain a 10 percent growth in GDP—as India's leaders desire—would need a 15 percent growth in electric generating capacity. Though recent trends suggest India's GDP growth-rate can outpace its growth in electricity output[3], even a 7.5 percent growth rate in electricity—half the historically indicated rate—would mean India must double its electricity from about 125 gigawatts today to over 250 gigawatts by 2016.[4]

In the early 1990s, India began electricity reforms that have unevenly advanced the country's effectiveness and efficiency in providing electricity to its 1.1 billion people.[5] Still, India's unreliable electric power grid inflicts an average of 17 major disruptions per month on Indian manufacturers, leading many factory owners to build their own electric generating facilities.[6] Perhaps as much as one-fifth of all electric power generated in India comes from such off-grid or “captive” generation, and many of these generators—especially smaller ones—use diesel fuel.[7]

The Indian government has recognized the need to improve its electric power sector and committed itself to greater energy independence and reliability. Indeed, all five of the government's top priorities to spur growth—improved water services, better energy supply, better education, building India's infrastructure, and employing more of the country's people—depend heavily on improving India's energy situation and particularly its electric services.[8]

Even with its hobbled electric services, the Indian economy has expanded at an average of about 6 percent real growth for over a decade. With former Finance Minister and economist Manmohan Singh as Prime Minister, India continues to institute business, economic and educational reforms, leaving India poised to realize even greater growth in the years ahead.[9] Despite India's powerful labor unions, its resilient communist party, and the dismal example of Enron's Dabhol power project, the country's desperate need for electricity and its market-oriented reforms are attracting the attention of would-be suppliers of electric power plants. Such progress bodes well for the United States, and for the people of India. Trade between the two countries grew to over 26 billion dollars in 2005, more than double the figure from 2000. American-based multinational corporations have built a thriving services sector in India—an arrangement that benefits America and India alike by boosting U.S. exports to India and adding jobs there. With continued economic growth, India's middle class of 300 million consumers will prosper, stoking global trade.

While India's leaders hope to boost the country's economic growth rate to 10 percent, the shortage of reliable and affordable energy acts as a brake on growth.[10] The growing gap between electricity supply and demand, as well as the effects that gap has on India's economy, highlights the adage that, “No energy is as costly as no energy,”—an observation attributed to the late Homni Bhabha, a pioneer of India's civilian nuclear power program.[11]

II.

In order to meet its enormous energy needs, India is counting on developments in all forms of electric power generation, including nuclear power. While hydropower figures prominently in India's plan—with some high-end projections that India will grow from about 15 gigawatts today to over 80 gigawatts of capacity by 2020[12]—India's ability to expand hydroelectric power is limited in part by overpopulation and the inability to relocate people who would be displaced by the water backed up behind new dams.[13] Even if India can achieve such an ambitious expansion of its

hydropower production, it will still need other sources of electric power. Non-hydropower renewable energy supplies, such as solar and wind, provide a mere three-tenths of one percent of India's electricity generation—well under half of a megawatt of capacity, or the equivalent of a single medium-sized U.S. power plant. Yet India's president, Abdul Kalam, forecasts 100 gigawatts of non-hydropower renewable energy by 2020. According to Kalam, much of this energy will come from solar power, including small-scale, distributed solar power generation that could benefit India's farmers. These soaring projections are, however, based on a presumed technological breakthrough that will significantly reduce costs while delivering a three-fold increase in the efficiency of solar cells.^[14] Clearly, India's president is counting on dramatic and improbable increases in the country's capacity to generate electricity from hydro-power and other renewable sources, and India should look to other energy options.

With about 17 percent of the world's population, India is endowed with a paltry portion of the world's oil and gas reserves, amounting to less than one percent of the known global total.^[15] Absent improvements in the reliability of electricity services, Indian manufacturers and individual households are likely to continue using off-grid or "captive" generation that depends mostly on petroleum and natural gas to produce electricity. Such practices modestly heighten competition in today's tight oil and gas markets, adding slight upward pressure on prices. India's domestic gas production supplies only about half of the amount the country consumes, and the rapid growth in gas imports slowed dramatically in 2006 due to increased natural gas prices and uncertainty over Iranian liquid natural gas (LNG) and pipeline projects. In summary, India will continue its path of growing dependence on imported oil and gas, some of which will be used to produce electricity, but neither oil nor gas is a viable alternative for meeting India's burgeoning electricity needs.

While India lacks abundant indigenous supplies of oil and gas, it is loaded with coal, and 70 percent of the coal mined in India goes into producing electricity. India ranks fourth in the world in terms of coal reserves, and is the world's third largest coal producer behind the U.S. and China.^[16] But, Indian coal is of poor quality, it is malpositioned, and approximately 90 percent of it is mined by India's inefficient state-owned Coal India Ltd (CIL).^[17] India's coal deposits are concentrated in the east of the country, requiring transport on India's overstressed rail system. Moreover, with 35 percent ash and low energy-content, India has already resorted to importing cheaper, higher-quality coal, adding to congestion at its ports.^[18] Without "clean-coal" technology, an increased use of coal would add to India's already significant problems with pollution. While coal will continue to dominate as a fuel for India's electric power sector, the country's leaders are anxious to shift to cleaner means of generating electricity.

Today, nuclear energy accounts for just three percent of India's electric power generating capacity, compared to a world-wide average of about 16 percent.^[19] The 14 nuclear power plants India agreed to put under International Atomic Energy Agency (IAEA) safeguards represent approximately 3,000 megawatts or 3 gigawatts of generating capacity. By 2020, India plans to add another 12-16 gigawatts of nuclear generating capacity to its power grid—quintupling its current nuclear capacity.^[20] The large percentage in growth reflects the relatively small role nuclear power plays in India today, so that even by 2020, nuclear power will contribute only about seven percent of India's total generating capacity. However, it seems feasible nuclear power could play an even bigger role in India's future than is currently envisioned, given the technical and economic hurdles associated with other forms of energy.

Some of the same factors affecting India, help to explain why many of the 30 countries operating nuclear power plants today may be on the verge of a renaissance in nuclear energy. The U.S. is by far the biggest producer of nuclear energy, with 103 nuclear power plants, representing one-quarter of the world total, and over 27 percent of the global nuclear generating capacity. Soaring natural gas prices have dramatically curbed the boom in new gas-fired power plants, contributing to extensions of nuclear plant licenses in the U.S., the United Kingdom, and Germany. China, with just nine nuclear power plants today, intends to build thirty new nuclear plants by 2020. In

early 2006, Germany reversed a political decision to phase out nuclear power, and the U.S. Energy Policy Act of 2005 provided incentives for six new U.S. nuclear power plants.

Proponents of nuclear power are predicting many more new nuclear plants are likely to be built in the U.S. as new designs become standardized, thus easier for the Nuclear Regulatory Commission (NRC) to approve. Moreover, the NRC is moving toward streamlined approval and licensing procedures that reduce the time needed and the risks to utilities wishing to build new plants. Finally, under the U.S. administration's new Global Nuclear Energy Partnership (GNEP), America is exploring the possibility of a proliferation-resistant technique that would extract more energy from nuclear fuels and overcome some of the challenges of dealing with nuclear waste. The 250 million dollars requested by the Department of Energy for GNEP in the 2007 budget was in addition to 632.7 million dollars for other nuclear energy initiatives, including over 30 million for research and development of a new generation of nuclear reactors.

In short, nuclear energy is making a comeback globally, and it represents a modest but important component of India's plan for expanding electric power production. Absent dramatic growth and improvement in electricity services, India is unlikely to sustain its current rate of economic growth, much less achieve the 10 percent GDP growth rate sought by the country's leaders.

III.

Critics of the U.S.-India nuclear cooperation deal have exaggerated the impact it is likely to have on India's nuclear weapons program, global nonproliferation regimes, and the strategic balance in the region. They tend to overestimate the influence the U.S. has in inhibiting India's nuclear program, and they generally fail to acknowledge the potential utility of the deal for strengthening nonproliferation efforts. By opposing the deal on proliferation grounds, the critics implicitly advocate reinforcing failed policies of the past that, ironically, militate against outside influence and monitoring of India's nuclear facilities, thereby undermining nonproliferation goals.

Indeed, there was some early and hearty approval for the prospect of U.S.-India nuclear cooperation. Mohamed El Baradei, Director of the International Atomic Energy Agency, immediately embraced the proposed cooperation, stating: "It would also bring India closer as an important partner in the non-proliferation regime...It would be a milestone, timely for ongoing efforts to consolidate the non-proliferation regime, combat nuclear terrorism and strengthen nuclear safety."^[21] In addition, key members of the 45-nation Nuclear Suppliers Group (NSG), such as France, Russia and the United Kingdom, quickly voiced support for the U.S. deal with India. However, it should be noted that Canada and China, both NSG members, have been less enamored with it.

Within three weeks of the March 2006 announcement of the deal, Russia agreed to supply uranium to refuel two reactors at India's Tarapur nuclear site. Interestingly, low-enriched uranium for Tarapur's reactors has been supplied by NSG member states since those reactors came on line in 1969.^[22] If the U.S. fails to go ahead with the deal, it seems certain that other NSG countries will seek to supplant the U.S. in cooperating with India. America would hardly be in a position to object to the same sort of cooperation that it had first proposed.

But what is one to make of the claim that the deal threatens to destroy the global regimes for blocking proliferation. The Treaty on the Non-Proliferation of Nuclear Weapons (NPT) and the U.S. Nuclear Nonproliferation Act were designed to prevent proliferation by denying access to nuclear technology and nuclear materials for states that refused to sign the NPT. To bolster controls on nuclear technology and materials, the U.S. led the establishment of the Nuclear Suppliers Group in the mid-1970s. Though imperfect, the NPT and NSG provided a workable framework for international cooperation to limit the spread of nuclear weapons technology. Still, it would be a mistake to ascribe too much credit to the existing international nuclear proliferation

controls. Even if one leaves aside cases such as Argentina, Brazil, Libya, and South Africa, which have renounced their nascent nuclear weapons programs, there have been some glaring failures in the nonproliferation regimes' ability to limit the spread of nuclear weapons. Israel and Pakistan, neither of which signed the NPT, were assisted in acquiring nuclear weapons technology by signatories to the NPT, France and China, respectively. Iran and North Korea, both signatories to the treaty, have used nuclear technology, equipment and fuel, gained from civilian nuclear power programs, to develop nuclear weapons programs. Whatever the merits of the existing nuclear nonproliferation regimes, they have failed to prevent the spread of nuclear weapons and should hardly be viewed as immutable, eternally relevant bars to proliferation.

India is unique in that it did not sign the NPT and has developed its own nuclear weapons program. Though India reneged on its promise of fifty years ago not to use Canadian-supplied reactors and U.S.-supplied heavy-water to develop nuclear weapons, it never signed and therefore has not violated the NPT. Because India was cutoff from external technological assistance after conducting its first nuclear explosion in 1974, it has developed its own indigenous nuclear technology for the past 30 years. Today, India has a good understanding of the nuclear fuel cycle and claims to be pioneering techniques for using thorium as fuel; it has produced an arsenal of nuclear weapons, and it has built up its civilian nuclear power program. Certainly, India would like to gain easier access to enriched uranium, but it has thus far been unwilling to accept limits on its nuclear weapons program to gain that access. Moreover, though India remained outside the NPT, the country has been widely credited with responsibly preventing the spread of its own nuclear technology, including withholding nuclear weapons technology from Libya and Iran, despite being tempted with lucrative energy deals.^[23] The current proposal for U.S.-India nuclear cooperation, though not a treaty, would bind India through international agreement to continue its responsible nonproliferation policies.

Regardless of what the U.S. decides to do, India is likely to advance its nuclear power program and, if it so chooses, its nuclear weapons program, too. While the NPT and NSG remain important tools for international cooperation, their spotty track record and questionable relevance in the case of India—make it difficult to argue convincingly that stubbornly adhering to old policy strictures is somehow preferable to adopting new ones that are consistent with the goals of the nonproliferation regimes.

If the U.S. and India go ahead with cooperation on nuclear power, it will increase the potential for the transfer of nuclear expertise to India's nuclear weapons program. The leaders in New Delhi can promote such transfer or they can work to limit it. Therefore, the U.S. ought to structure its cooperation on nuclear power to ensure present and future Indian administrations cannot easily divert U.S. assistance to India's nuclear weapons program. Continued cooperation could be made contingent on U.S. presidential certification to Congress that India is not effecting such transfers. If adding contingencies for presidential certification would spoil the deal, as some experts believe,^[24] then perhaps barriers to technology transfers can be built into the technology used for producing power, that is, proliferation resistant technology. In addition to limiting the transfer of expertise to India's weapons program, the U.S. could use whatever leverage it has to move India to place limits on its production of fissile material. Even a temporary limit, subject to future review and renewal, would be a step in the right direction. However, history suggests that India will not commit to limitations on its nuclear weapons program and it is probably too late to add new provisions along these lines.

Certainly India has consistently prioritized its security interests, as it perceives them, above whatever benefits it might have accrued by joining the NPT. Over the past thirty years, it has paid a price for failing to join the NPT in 1968, and for subsequently testing nuclear explosives in 1974 and 1998. The U.S. has also paid a price in less than warm relations with India, but that price was smaller and more affordable when it was first imposed. Now that India has established a viable nuclear deterrent, further restrictions on nuclear cooperation will adversely affect India's civilian energy program and economic progress, more than they will affect its nuclear weapons programs.

In contrast to what critics of the deal say, U.S.-India nuclear cooperation appears to offer a viable way forward that is, on balance, beneficial to international nonproliferation goals.

IV.

For some observers, U.S. overtures to India are seen as an attempt to balance against or to contain China. Furthermore, nonproliferation groups worry that U.S.-India nuclear cooperation will allow India to use imported nuclear fuel for its power reactors, while husbanding its domestic supply of uranium for its weapons program. Either or both of these conditions—growing U.S.-India ties and the possible expansion of India's nuclear arsenal—it is feared, could lead to an arms race between China and India. The following paragraphs argue that although India probably intends to continue producing fissile material, it does not necessarily follow that that would upset the strategic calculations of China or the military balance in the region. Moreover, stronger U.S.-India ties could be a stabilizing force for South Asia and need not come at the expense of others.

India, by all accounts, has adopted a “force-in-being” posture for its nuclear weapons, whereby warheads are not kept in a ready status but instead remain disassembled and separated from their delivery systems. Like China, India has foresworn the first use of nuclear weapons and its nuclear doctrine is ostensibly based on minimal, credible deterrence, in which nuclear weapons would be used only in retaliation. At the same time, the Chinese have reportedly been modernizing and building up their nuclear weapons capabilities for at least a decade. China's strategic force modernization and buildup began long before the warming of U.S.-India relations. So, it would seem that China and India are well embarked on programs to meet their own perceived security needs, including modernization of their respective nuclear forces. It is unclear, therefore, why the Chinese leadership would recalibrate its nuclear force structure needs based on the U.S.-India nuclear deal—a deal that parallels U.S.-China nuclear energy cooperation that began in the late 1990s.

Though Beijing is unlikely to be moved by the U.S.-India nuclear power deal, China's leadership might well be wary of U.S.-India cooperation in the conventional military arena. American naval, air, and ground forces have, in recent years, engaged increasingly in joint military exercises with their Indian counterparts. Moreover since early 2005, the U.S. has been willing to sell Patriot Missiles and F-16 and F-18 fighter aircraft to India. With the vast bulk of China's fuel and other natural resources flowing from the Persian Gulf and Africa, through the Indian Ocean and the Straits of Malacca, China's military planners are undoubtedly concerned already about the security of their country's trade and energy supplies routes—especially given China's limited naval capabilities. Indeed, China's ongoing naval expansion and modernization is motivated no doubt in large measure by Beijing's perceived vulnerability to a blockade or embargo. As an antidote to Chinese concerns, India and the U.S. should seek to continue strengthening their ties with China. Just as the U.S. has in recent years simultaneously strengthened its relationships with both Pakistan and India, relationships among China, India and the U.S. should not be seen as a zero-sum equation.

In strengthening ties to China, the U.S. and India could begin cooperating as energy consumers. China is a major trading partner of both the U.S. and India, and all three countries share concerns for their own ballooning energy appetites and the apparent inability of world oil and gas suppliers to keep pace. In a global oil market, cooperation, rather than competition, would seem the wiser course. Though not yet as fungible as oil, natural gas appears to be on a similar trajectory to oil's in the 1970s—with LNG trade paralleling earlier market developments in oil trading. Given the potential for common interests as energy consumers, some experts have suggested India and China be encouraged to form cooperative arrangements with the International Energy Agency and that the two rapidly developing Asian powers should establish strategic petroleum reserves—just as countries of the Organization of Economic Cooperation and Development (OECD) did to protect themselves against disruptions in oil markets in the 1970s.[\[25\]](#)

China's energy situation has been similar to India's in many respects. Though it took more than a decade to win Congressional approval, by the end of the 1990s the U.S. finally began cooperating with China on nuclear energy. Since then, U.S.-China trade in nuclear power technology and equipment has risen to become the second fastest growing export item from the U.S. to China.^[26] Like India, China's electric services are characterized by inadequate capacity and blackouts. Part of the global surge in oil prices in 2004, was due to increased Chinese demand, including significant amounts of fuel needed for diesel generators to compensate for the country's sagging electric services. Like India, China is rich in coal and faces challenges with air pollution. Like India, China is pursuing multiple paths toward improving its energy situation, with hydroelectric, renewable power, and nuclear power. As China's leaders aggressively attempt to lock up oil and gas supplies around the globe, they should be quick to recognize that advances in Indian nuclear power would reduce—if only modestly—competition for imported fossil fuels.

As China and India strive to meet their respective energy and security needs, there seems little likelihood that U.S.-India nuclear cooperation will somehow spark a nuclear arms race. To the extent India and China continue to develop nuclear arms, it will not be caused by U.S.-India cooperation on civilian nuclear power. To the extent there is an arms race in the region, it is likely to be a conventional one, stemming from hedging strategies by all parties concerned and the classic security dilemma induced by such hedging. Succinctly, nuclear arms developments and conventional arms racing in the region should be seen as relatively independent of U.S.-India cooperation on civilian nuclear power.

A more likely concern than a China-India nuclear arms race is the potential for Pakistan to demand nuclear cooperation that mirrors the deal India gets with the U.S. Pakistan, regrettably, suffers from several disadvantages compared to India, making any nuclear cooperation with Pakistan unlikely in the foreseeable future. First, Pakistan is considerably less stable, ruled as it is by General Musharraf who took power in a coup from a democratically elected government and who has been the target of at least four assassination attempts. Second, the reckless proliferation activities of A.Q. Kahn—the father of Pakistan's nuclear weapons program and still a hero inside Pakistan—stand in stark contrast to the perception of India as being responsible in resisting proliferation.^[27] Pakistan's historic ties to Islamic extremist groups and lingering suspicions that such ties still exist, should give pause to any would-be supplier of nuclear arms technology. Finally, Pakistan does not enjoy the same robust command of nuclear science and technology as India, thus the potential spillover from Pakistan's civilian power sector to its weapons program would appear to be much greater than in the case of India. The U.S. and other NSG countries should continue to pursue closer ties with Pakistan and support its development, but not through nuclear cooperation.

In summary, absent a dramatic change in India's nuclear weapons posture, U.S.-India cooperation on civilian nuclear power is unlikely to significantly alter the strategic calculus or nuclear force structure of China or Pakistan.

V.

Stopping nuclear proliferation remains a vital goal for the United States, but arguments about the potential harm the U.S.-India nuclear power deal would do to nonproliferation regimes have been exaggerated. On balance, the deal should help strengthen global nonproliferation efforts by bringing India into the fold—at least partially, by bringing proliferation-resistant nuclear technology to India, and by codifying in international agreements the responsible policies India has taken unilaterally—but could just as easily reverse unilaterally.

India's energy needs are dire, and those needs will only be met through a variety of energy sources, including nuclear power. The sooner India begins adding nuclear generating capacity, the better for curbing India's growing oil and gas appetite and the less India will have to rely on

coal. While the nuclear cooperation deal between India and the U.S. does not fit neatly into the NPT or the existing U.S. Atomic Energy Act, it does provide a viable way forward. Not only would the deal advance the two countries' economic and security interests, it promises to help unlock India's potential as a vast market for exports, thereby benefiting the global economy. The ultimate outcome of the deal will help set the course for the U.S. relationship with a rising India. As statements from President Bush and Secretary of State Condoleezza Rice make clear, the question is not whether India will grow, the question is what sort of relationship the U.S. would like to have with a growing India.^[28] Viewed in that light, roadblocks to U.S. cooperation with India could end up hurting America's interests more than India's.

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References

1. The World Bank Group, "The World Bank Group's Energy Program: Poverty Reduction, Sustainability and Electricity" (Washington, DC: Energy and Mining Sector Board, December 2001), 2.
2. Rahul Tongia, [The Political Economy of Indian Power Sector Reforms](#), Working Paper, no. 4 (Revised), Program on Energy and Sustainable Development, Stanford University, December 2003, 17.
3. [Ibid.](#), 7 and 18.
4. Projections for the growth of India's electricity output vary from the International Energy Agency's low of 4.4 percent per annum to about 10 percent a year—favored by India's president, Abdul Kalam, and by Rajat Gupta, Vipul Tuli, and Samir Verma, in "Securing India's Energy Needs," *The McKinsey Quarterly. 2005 Special Edition: Fulfilling India's Promise*. Doubling India's electricity production by 2015 corresponds to a growth rate of about 8 percent, matching projections made by the Department of Energy's Energy Information Agency's [India Country Brief](#), updated December 2005.
5. Tongia, [Op. Cit.](#), 7-10; and P.R. Shukla, et al., *Electricity Reforms in India: Firm Choices and Emerging Generation Markets* (New York: McGraw-Hill, 2004), 1-2.
6. World Bank statistic cited in Gupta, Tuli, and Verma, *Op. Cit.*

7. This captive generation is in addition to the hundreds of thousands of small generators or “gensets” mentioned above. Tongia, [Op. Cit.](#), 15-17; and P. R. Shukla, et al., *Op. Cit.*, 61.
8. Dr. A.P.J. Abdul Kalam, President of India, “[Dynamics of Economic Growth in India.](#)” [Interactive Session with Top Intellectuals of Singapore](#),” February 2, 2006.
9. Rajat K. Gupta, “India's Economic Agenda: An Interview with Manmohan Singh,” in Gupta, Tuli, and Verma, *Op. Cit.*
10. Gupta, Tuli, and Verma, *Op. Cit.*, and, U.S. Department of Energy, [India Country Brief](#), updated December 2005.
11. Tongia, [Op. Cit.](#), 8.
12. Kalam, [Op. Cit.](#)
13. International Energy Agency, [World Energy Outlook 2004](#) (Paris: IEA Publications, 2004), 269.
14. Kalam, [Op. Cit.](#)
15. Kalam, [Op. Cit.](#), and Central Intelligence Agency, “[India](#),” *The World Factbook*, February 1, 2006.
16. Energy Information Agency, [International Energy Outlook 2005](#) (Washington, DC: Department of Energy, July 2005), 95.
17. Tongia, [Op. Cit.](#), 13 and 14; and Gupta, Tuli, and Verma, *Op. Cit.*
18. Tongia, [Op. Cit.](#), 13 and 14.
19. C.I.A., “[India](#),” *Op. Cit.*; and International Energy Agency, [World Energy Outlook 2005](#).
20. Indian President Abdul Kalam projects an addition of more than 16 gigawatts of nuclear generating capacity, while the U.S. Department of Energy’s Energy Information Agency forecasts an increase of 12 gigawatts. Kalam, [Op. Cit.](#), and Energy Information Agency, [World Energy Outlook 2004](#), 74.
21. Mohamed El Baradei, “[IAEA Director General Welcomes U.S. and India Nuclear Deal](#),” International Atomic Energy Agency Press Release 2006/05, 2 March 2, 2006.
22. The U.S., then France, then China, and now Russia have, in turn, continuously supplied India with low-enriched uranium. Sharon Squassoni, [U.S. Nuclear Cooperation with India: Issues for Congress](#), Congressional Research Service Report for Congress, updated January 12, 2006, page CRS-2.
23. Sumit Ganguly, “[Giving India a Pass](#),” *ForeignAffairs.org Author's Update*, August 17, 2005. It should be noted that in 2004, the U.S. State Department placed sanctions on two Indian nuclear scientists who may have cooperated with Iran, though sanctions were later withdrawn against one of the two, C. Surendar, they remain on Dr. Prasad. Sharon Squassoni, [U.S. Nuclear Cooperation with India: Issues for Congress](#), CRS Report for Congress, March 6, 2006, 11 and 12.

24. Michael A. Levi and Charles D. Ferguson, *U.S.-India Nuclear Cooperation, Council Special Report, no. 16* (New York: Council on Foreign Relations, June 2006), 21; and Ashton B. Carter, "[America's New Strategic Partner?](#)", *Foreign Affairs* 8, no. 4 (July/August 2006), 34-35.

25. John Deutch and Jamers R. Schlesinger, *National Security Consequences of U.S. Oil Dependency*, Council on Foreign Relations Independent Task Force Report, no. 58, Directed by David G. Victor (New York: Council on Foreign Relations, October 2006), 9, 10, 28, 52, and 60.

26. U.S. Government Accountability Office, "China Trade: U.S. Exports, Investment, Affiliate Sales Rising, but Export Share Falling," GAO-06-162, December 2005, 50.

27. If it turns out that India's Dr. Prasad was secretly transferring nuclear technology to Iran, the contrast between India and Pakistan would not be so stark; but such evidence would argue against cooperation with India, not for nuclear cooperation with Pakistan.

28. President George W. Bush, "[President Addresses Asia Society, discusses India and Pakistan](#)," White House Press Release, February 22, 2006; and Secretary of State Condoleezza Rice, "[The U.S.-India Civilian Nuclear Cooperation Agreement](#)," Opening Remarks Before the Senate Foreign Relations Committee, Washington, DC, April 5, 2006.